CLAIMS:

1. A method for optical control of the quality of a process of chemical mechanical planarization performed by a polishing tool applied to an article so as to determine the existence of at least one of residues, erosion and dishing conditions on the article, wherein the article has a patterned area which containing a plurality of stacks each formed by a plurality of different layers thereby defining a pattern in the form of spaced-apart metal regions, the method comprising the steps of:

(a) selecting at least one predetermined site on the article to be controlled;

(b) illuminating said at least one predetermined site;

(c) detecting spectral characteristics of light components reflected from the at least one illuminated site of the article, and generating data representative thereof; and

(d) analyzing said data for determining at least a thickness of at least one layer of the article within said at least one illuminated site.

2. The method according to Claim 1, wherein said at least one predetermined site is selected in accordance with information provided by a manufacturer of the article.

3. The method according to Claim 1, wherein said at least one predetermined site is disposed outside said patterned area, the determined parameter being indicative of the residues of materials to be removed from the article.

4. The method according to Claim 1, wherein said selecting of the at least one predetermined site comprises the step of:

- applying a preliminary inspection to an article that has a structure similar to said article to be measured but is at least slightly under-polished by said polishing tool, said at least one predetermined site being that where residues are detected during the preliminary inspection.

5. The method according to Claim 4, wherein said preliminary inspection comprises:

- detecting light reflected from the at least slightly under-polished article and obtaining data representative thereof;
- analyzing said data to detect the sites having optical properties different from those of other locations on the article.

6. The method according to Claim 4, wherein the different optical properties define a certain range of contrast of the reflected light.

7. The method according to Claim 4, wherein the different optical properties define certain spectral characteristics of the reflected light.

8. The method according to Claim 1, wherein said at least one selected site has substantially irregular geometry, as compared to that of any other location on the article.

9. The method according to Claim 1, and also comprising the steps of:

- illuminating at least one additional site on the article spatially separated from said at least one predetermined site;
- detecting spectral characteristics of light reflected from the at least one additional illuminated site, and generating data representative thereof; and
- analyzing said data for determining at least one parameter of the article within said at least one additional illuminated site, said parameter being indicative of the erosion condition.

10. The method according to Claim 9, wherein said at least one predetermined site is selected outside the patterned area, while said at least one additional site is selected inside the patterned area.

11. The method according to Claim 9, wherein said analyzing of the data comprises the steps of:

- determining a first thickness of at least one layer of the article within said at least one predetermined site;
- determining a second thickness of at least one layer of the article within said at least one additional site;
- using a proper optical model for calculating the first and second thicknesses, the optical model being based on at least some features of the article and capable of

determining data representative of photometric intensities of light components of different wavelengths reflected from the article.

12. The method according to Claim 11, wherein a difference between the first and second thicknesses corresponds to the erosion condition within said at least one additional site.

13. The method according to Claim 1, wherein

- said at least one predetermined site is located inside the patterned area of the article;
- said analyzing utilizes a heuristic optical model based on at least some of features of the article and capable of determining data representative of photometric intensities of light components of different wavelengths reflected from the article and of calculating thickness of at least one layer of the article within said predetermined site, said model utilizing the existence of an additional, ambient layer above the metal region containing dishing.

14. The method according to Claim 1, wherein said selecting of the at least one predetermined site comprises the step of:

- performing preliminary monitoring by applying steps (b) to (d) to a test article constructed similar to said article under CMP, but being at least slightly over-polished, said at least one predetermined site being that where the erosion condition is detected during the preliminary monitoring.

15. The method according to Claim 1, wherein said selecting of the at least one predetermined site comprises the step of:

- performing preliminary monitoring by applying steps (b) to (d) to a test article constructed similar to said article under the CMP process, but being at least slightly over-polished, said at least one predetermined location being that where the dishing condition is detected during the preliminary monitoring.

16. A monitoring system for optical control of the quality of a process of chemical mechanical planarization performed by a polishing tool applied to an article having a patterned area, so as to determine at least one of residues, erosion and dishing conditions on the article, wherein the article contains a plurality of

stacks each formed by a plurality of different layers, thereby defining a pattern in the form of spaced-apart metal regions, the system comprising:

a spectrophotometer illuminating at least one site of the article by incident radiation of a preset substantially wide wavelength range and detecting light reflected from the illuminated site for providing measured data representative of photometric intensities of detected light within said wavelength range;

an imaging arrangement capable of acquiring images formed by reflected light components of light reflected from the illuminating sites; and

a processor unit coupled to the spectrophotometer and to the imaging arrangement, the processor unit comprising a pattern recognition software and a translation means so as to be responsive to said measured data and locate measurements, the processor unit being capable of applying a proper optical model based on at least some features of the article for providing theoretical data representative of photometric intensities of light reflected from the article within said wavelength range and calculating at least one desired parameter of the article within said at least one site.

17. The system according to Claim 16, wherein said system is an integrated system with a production line for manufacturing said articles.

18. The system according to Claim 16, and also comprising an imaging apparatus for performing preliminary inspection of said article for detecting said at least one site.

19. A production line for manufacturing articles, each having a patterned area containing a plurality of stacks each formed by a plurality of different layers, thereby defining a pattern in the form of spaced-apart metal regions, the production line comprising a polisher to be applied to said article for performing a chemical mechanical planarization of an uppermost metal layer of the article, and an optical monitoring system for determining at least one of residues, erosion and dishing conditions on the article, the system comprising:

a spectrophotometer illuminating at least one site of the article by incident

radiation of a preset substantially wide wavelength range and detecting light reflected from the illuminated site for providing measured data representative of photometric intensities of detected light within said wavelength range;

an imaging arrangement capable of acquiring images formed by light reflected from the illuminating sites; and

a processor unit coupled to the spectrophotometer, the processor unit comprising a pattern recognition software and a translation means so as to be responsive to said measured data and locate measurements, the processor unit being capable of applying an optical model based on at least some features of the article for providing theoretical data representative of photometric intensities of light reflected from the article within said wavelength range and calculating at least one desired parameter of the article within said at least one site.

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